Attending: Alexander Makshtas, Gabriela Schaepman, Alexander Schultz, Matthew Shupe, David Cook, Sara Morris, Chris Fairall, Andrey Grachev, Ola Persson.

Agenda:

1) Introductions

Most members were already acquainted however we were happy to welcome new participants Gabriela Schaepman from an IASC Terrestrial modeling working group (works with a station between Cherskii and Tiksi) and Alexander Schulz (who works with data from Ny-Alesund and Barentsburg)

2) Overview of where the group left off (Uttal)

In the previous season, the IASOA Flux WG had discussed such things as developing "gold files" for certain stations and strategies for dealing with complex horizontal inhomogeneous surfaces. The group spent several sessions discussing the format and intended outcomes for the Circum-Polar Arctic Flux Workshop that was held in Hyytiälä, Finland on 6-9 February 2017.

https://www.atm.helsinki.fi/peex/index.php/circum-polar-arctic-flux-workshop

Several members of the IASOA Flux working group were in attendance and a workshop report was produced. It was notable that the workshop brought together scientists interested in energetic, hydrological and chemical fluxes; three groups that often work separately. The Workshop report is linked with these meeting notes.

3) Alexander presentation (Makshtas)

Alexander Makshtas presented details of a system for measuring fluxes that has been deployed on Spitsbergen. This is a system that was assembled to specification by Campbell Scientific. Alexander presented specifications on the system and discussed power sources for daylight and nighttime periods. There are 2 levels of W, T, RH, as well of snow height, IR surface temperature, active layer temperature to 65 cm and LW and SW measurements. The system is meant to be mostly autonomous but requires visits every 2 weeks in the wintertime. For calculation of turbulent fluxes the Grachev parameterization is used for stably stratified conditions. Sensors are not heated. The presentation is linked to these notes.

4) Irina presentation (Repina)

Irina Repina was unable to make the call but very kindly provided slides on a alternate system that has been developed by her research group. This system emphasizes the importance of making profile measurements of turbulent fluxes. Notably, this system allows calculation of fluxes with eddy correlation techniques because sonic anemometers are utilized at 3 levels. This presentation is also linked to these notes.

5) Discussion (All)

There was a lively discussion centered on 4 topics concerning "best practices":

- What essential variables should be measured?
- How should variables be evaluated in terms of a feasibility-impact matrix?
- What temporal resolution is required for measurement for product level reporting?
- Large investments have been made in tall towers instrumented at several levels. How much of the job can be done with smaller, integrated and autonomous systems? (Thinking towards

continuous operations at IASOA observatories and campaigns like MOSAiC – i.e over land, ice and open water).

Gabriella noted that she is using a highly parametrized, simple model with remote sensing input and wondered if anyone was using a more mechanistic, coupled atmosphere surface model.

There was discussion if the IASOA Flux group felt it would be important to produce products that could be submitted to FLUXNET or AMERIFLUX. Taneil had a student (thanks Kevin Olivas!) produce a quick look table of what variables of interest to the energetic flux community are archived with these organizations and which IASOA stations are submitting currently (not many). This presentation is linked.

There was quite a bit of discussion about the importance of ancillary data – topography, ground types, and for complex terrain locations, information on horizon elevations and characterization of data with respect to synoptic flow.

There was some discussions that an optimum flux network might require simple spatially distributed "microsites" measuring certain fundamental quantities such as albedo, snow height and ground fluxes around more intensive measurement sites.

Ola made the comment that bulk parameterizations seem to be working reasonably well.

Sara commented that Mika Aurela had made a very detailed survey both on the ground and from space of the Tiksi site. It might be interesting to have him present on this work in the future.

For calibration, there was discussion about the importance of absolute versus relative accuracy which would be especially important for spatially distributed site and that the use of multiple sensors allows in field relative calibration.

Some questions were asked about the success with operating LI-7500 versus LI-7200 anemometers in the Arctic environment with the difference being open or close path and heating versus no heating.

Chris F. noted that maybe not so important to flux networks mostly concerned with CO2 fluxes however noted that he though it was useful and important that the FLUXNET database include fluxes determined by ERA-Interim.

ACTION ITEMS:

Next meeting Gabriella Schaepman will present about her Siberian site which is of particular interest because of extreme remoteness and standard operation that include measurements and model calculations.

PROPOSAL TO GROUP: This group will work on designing an optimal, adaptable, portable and autonomous energy flux measurement system with standardized products. This will be the stated objective of meetings until a design document is produced and approved by this group of experts.